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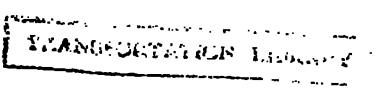

REPORT

RELATIVE TO

RAILWAYS

BETWEEN

EDINBURGH AND GLASGOW.

BY A SPECIAL COMMITTEE
APPOINTED BY THE DIRECTORS OF THE
EDINBURGH AND GLASGOW UNION CANAL COMPANY.

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REPORT.

THE Committee of Management of the EDINBURGH AND GLASGOW UNION CANAL COMPANY, having appointed a Special Committee to draw up a Report relative to the proposals which are at present making, to form two different Railways betwixt these cities, the said Committee proceed to submit to their fellow Partners some statements, with the view of exhibiting the delusive nature of these speculations, in the hope that, through their means, the more thinking part of the public will have their eyes opened to the hazardous nature of such undertakings. It may, indeed, be supposed that the Committee have an interest in checking the progress of these speculations, and that, therefore, their representations on the subject are not to be received without caution; but, while they readily admit this to be the case, it will be their anxious endeavour, when exposing the exaggerated statements of others, to guard against exaggerated representations themselves. They will base their statements, as far as possible, upon simple FACTS, of the accuracy of which the world have the means of judging; and, indeed, these so clearly demonstrate the danger of embarking in such speculations, that they are under little temptation to indulge in any thing like coloured or exaggerated representations.

Though the mania for joint-stock companies, which raged about six years ago, has received a powerful check, and though it is probable few of the present shareholders of the companies which were established about that period, will be disposed to become permanent proprietors in these railway companies; yet, as there may be persons who, being ignorant of the direful consequences which have resulted from it, may be tempted to become subscribers by the imposing representations which are given of the mighty advantages which Edinburgh and Glasgow, and the whole of the intermediate country, will derive from such undertakings, and the large pecuniary return which they will make to those who invest their capital in them,—it is of much importance to warn such individuals to consider well before they risk their property in such hazardous speculations.

Notwithstanding the confidence with which some have of late talked of the advantages of railways, it is obvious that the whole are as yet, in some degree, only matter of experiment. But it is no matter of experiment that there are persons who, seizing on the speculations of the day, endeavour to turn them to their own private advantage, under the profession of zeal for the public good. It is now no secret that many of the joint-stock companies which were formed a few years ago, were, in the first instance, got up by persons for the purpose of acting themselves as the agents, or of providing situations for their friends in these companies. It is no secret, that, while the shareholders in most of these companies have been involved in very exten-

sive losses, none have derived benefit from them except the projectors, the jobbers, and those who held situations in them.

The railways at present projected between Edinburgh and Glasgow are two in number. The one, of which a survey has been formed by James Jardine, Esq. Engineer, it is proposed should proceed by what has been called the South Line, from Leven Lodge at the west end of the Meadows, Edinburgh, to Barrowfield, at the east end of Glasgow. The whole expense is estimated at £451,600, or, including branches to Leith, the Broomielaw, and Camps Lime-works, L.520,129; and the following is the estimate which has been formed of the revenue:

Coals, . .	L.17,150
Ironstone and Iron, .	2,809
Freestone, . .	2,750
Lime, . .	2,425
Grain and Whisky, .	3,600
Sugar, . .	2,000
General goods, 50 tons per day,	9,500
Agricultural produce, Manure, &c.	2,950
Passengers, 300 per day, half at 5s.; half at 2s. 6d. deducting expense of carriages and locomotive engines or horses, .	12,000
	L.55,184
Deduct expense of maintaining railway, management, casualties,	9,500
	45,684

Which would yield nearly 9 per cent on the estimated cost.*

The other line of railway is that proposed by Messrs Grainger and Miller, Engineers, which, for the sake of distinction, has been called the North Line. This, it is proposed, should commence at Leith, and should join the Garnkirk Railway, in order to save the necessity of carrying it forward to Glasgow. The whole expense, including two branches to Benhar and Raw-Camp, is estimated by the engineers at L.354,000;† and the following is the prospectus which they give of the revenue:

"Passengers,	L.53,040
"Goods from Glasgow and the River Clyde to Edinburgh and the Port of Leith,	18,720
"Coal,	5,000
"Farm produce, &c.	3,000
"Iron Work,	2,000
	L.81,760

"As the Garnkirk Railway," the engineers add, "as well as that proposed from the western termination thereof to the River Clyde, will form part "of the general communication from sea to sea, a "proportional deduction must be made from the "revenue according to their relative interests, "which, with the expenses of maintenance, ma-

* Report of a Railway from Edinburgh and Leith to Glasgow, 1830, p. 5, 11.

† The Committee propose that the capital of the company should be L.400,000.

" nagement, and the expense attending the convey-
" ance of passengers, may be estimated at L.21,760,
" leaving a balance of L.60,000 as interest upon the
" estimated capital of L.354,000, which is at the
" rate of about 17 per cent."*

It is not by Messrs Grainger and Miller only that these high hopes are held out: the Committee in Glasgow confirm them by all the weight of their authority. " While the union of the two seas," say they, " is an important object, the union of the two " great cities of Edinburgh and Glasgow, within 41 " miles of each other, and each embracing, with its " suburbs, a population of nearly 200,000 inhabi- " tants, cannot fail to render the undertaking *a* " *source of liberal remuneration to its promoters.*"

" The Committee, in noticing the particulars of " revenue stated by Messrs Grainger and Miller, " consider the same *by no means overrated* in the " aggregate, and that there *cannot be a doubt* of " the undertaking combining with its acknowledg- " ed utility *a handsome return on the stock.*"†

These are splendid promises. But let them not be too readily listened to. Of the schemes which have of late years been set on foot, the most nearly allied to the EDINBURGH AND GLASGOW RAILWAY, is the EDINBURGH AND GLASGOW UNION CANAL; and it is worthy of observation, that not less flattering, and, in some respects, remarkably similar prospects, were held forth in regard to the Canal, as are now given relative to the

* Grainger and Miller's Observations on a Railway Communication between Edinburgh and Glasgow, p. 9.

† Grainger and Miller's Observations, App. p. 2.

Railway; but the unfortunate shareholders in that concern can tell how miserably they have been disappointed. In proof of this, it may not be without its use to give a few of the statements which were made relative to the *prospective* expense and revenue of that undertaking, compared with its *actual* expense and revenue.

1. By the Report of Mr Hugh Baird, the engineer who was employed to form the survey—(and it cannot be said that he was unqualified for the task, for he had more experience in such matters than any engineer of his day)—the expense was originally calculated at £235,167;* and by a subsequent Report, (in consequence of some alterations that were made on the plan) at £246,321, 16s.† But the estimate of the expense of the Canal did not rest on the authority of Mr Baird only: that celebrated engineer, Mr Telford, was employed to examine the proposed line of the Canal, and the estimate which had been formed of the expense. His Report of the line was of the most *flattering* kind; and in the estimate of the expense, he substantially agreed with Mr Baird. In his first Report he says: "I have not "yet had time to go through the calculations in order "to prove Mr Baird's estimate: *it appears to have* "*been made out with great care.*" In his second Report he says: "I have bestowed much pains in "going through *minute* calculations in regard to the "expense at which *every part of the sundry works*

* Report on the proposed Edinburgh and Glasgow Union Canal, by Hugh Baird, 1814, p. 24.

† Additional Report regarding the Union Canal, p. 12.

" may be constructed." He then adds the particulars of his estimate, which amount in all to £240,468 17s. 2d.*—a calculation so near to that of Mr Baird, as to afford a powerful, yet a very *deceptive*, corroboration of the accuracy of both.

Now, what was the actual expense of the Canal? By the statement published by the Company up to December 1827, it was not less than £448,955, 14s. 5½d.†; and if to this be added the loss of interest which the shareholders have sustained on the capital they have advanced, it has cost them upwards of £600,000, or *nearly three times* the sums which were calculated by Mr Baird and Mr Telford.

2. By Mr Baird's report, the annual revenue of the Canal was to amount to L.52,727, 13s. 4d., and in an "Answer to a Pamphlet entitled *Observations on the Report of Mr H. Baird relative to the Union Canal*," there is the following still more flattering statement:

" This," says the writer of that pamphlet, " would " appear a prodigious revenue, even though com- " pared with a much greater expense. Yet it has " *since appeared*, that the revenue of the Union " Canal was *greatly underrated* by this estimate. " In compliance with the instructions of his em- " ployers, who desired to form *no extravagant* ex- " pectations of the enterprize they proposed to un- " dertake, Mr Baird proceeded with such *caution* " and *moderation*, that certain sources of revenue " were *purposely omitted*, and others *plainly under-*

* Reports by Mr Telford, in Appendix to Observations on the Objections of the Inhabitants of Leith to the Union Canal, p. 4, 6.

† To this might perhaps be added sundry other sums, which would raise the whole expense considerably higher.

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evil. It might be supposed that we had reached the climax of the mischief; but one statement remains to be made to crown the whole. The dividends, which, as already stated, have amounted only to 27s. a share, though declared, have not been *received* by most of the shareholders, though they have all paid the full amount of their original shares—L.50; for in consequence of the expense of the Canal having so far exceeded the original estimates, it became necessary, in order to liquidate the debt of the Company, to allocate on each share L.46, a sum nearly equal to what it originally cost; and till this sum is paid, the shareholders can receive no dividend, but any dividends that may be payable must be placed to their allocation account with the Company. Now, when the dividends may amount to L.46, no man can tell: not perhaps for twenty or thirty years to come. *Such are the miserable results of the splendid promises which were originally held out in regard to the Edinburgh and Glasgow Union Canal!*

It will no doubt indeed be alleged, that Railways possess such decided advantages over Canals, that we are not entitled to argue from the one to the other; but it may be remarked, that the same *miscalculations* may be made as to the *expense* and the *revenue* of a Railway as of a Canal, and the same *fallacious promises* may be made in regard to the one as well as the other.

Railways have as yet been executed in comparatively few instances; and therefore we have little means of comparing the *prospective* with the *actual* expense of such undertakings. Enough, however, is

known to throw great doubts on the prospective estimates which are given of the expense of the projected Railways between Edinburgh and Glasgow. The expense of the Liverpool Railway, surveyed in 1824, including the charge for locomotive engines to be employed on the line, and other contingencies, was estimated at only L.400,000; and though, when a new line was adopted the following year, it became evident that the cost would much exceed the former estimate; yet still the capital of the company was proposed to be only L.510,000. But both of these estimates have proved perfectly fallacious. The expenditure for the Liverpool Railway, up to the 31st of May last, amounted to L.739,165. Since then, however, there has been a considerable additional outlay, and the Railway is not even now quite complete. The Directors, in a Report dated the 25th March last, estimated that the total expenditure, including warehouses, machinery, and engines, would amount to L.820,000.* It is stated, indeed, that it will probably not fall much short of L.1,000,000,†—or nearly *double* the original capital of the Company. Such, then, is the expense of the Liverpool Railway, although it is only 31 miles in length, and over ground nearly level. Now, this being the case, how is it probable that a railway by the north line, from Edinburgh to Garnkirk, and with its branches to Leith, Benhar, and Raw-Camp, extending to 42 miles, passing over very

* Booth's Account of the Liverpool and Manchester Railway, p. 10. 23. 25. 97. 103.

† Mechanics' Magazine, September 1830, p. 55.

irregular ground, and rising to an height of 630 feet, will cost only L.354,000? Or how is it credible that a railway, by the south line from Edinburgh to Glasgow, extending to 44 miles, and rising to an elevation of 804 feet, will cost only L.451,600? Taking it at the same rate as the Liverpool Railway, it should cost about L.1,420,000, which is upwards of *three times* the sum estimated by Mr Jardine. It is possible there may be circumstances of which we are ignorant, that may occasion a considerable difference between the Liverpool and the Edinburgh Railway in point of expense; but it is scarcely possible to conceive of any circumstances which shall reduce the sum of *one million four hundred and twenty thousand pounds* to L.451,600. Let us, on account of these supposed circumstances, deduct *half a million*, (a large deduction certainly) still there will remain an expense of L.920,000, as the expense of the Edinburgh Railway, instead of L.451,600. And where, then, will be the splendid promises which were held forth to the shareholders of a handsome return for their money?

The Dalkeith Railway is of comparatively small extent, and one of which the expense might have been calculated with much greater certainty. But a few facts relative to this undertaking will show how little confidence is to be placed in estimates of this kind, even when made under the most favourable circumstances.

The estimate for making the main line of the Dalkeith Railway was L.57,700; but in a Report,

printed by the Directors in February 1829, it was stated, that Mr Jardine had prepared an estimate of what would still be necessary to finish the undertaking, and that it was now found that the whole expenses of the original line would not be less than L.104,713.

But in order to *complete* the undertaking, the Directors, in the Report now referred to, proposed to form three new branches to the main line.

1. A branch to Fisherrow, which Mr Jardine estimated would cost L.4,786. "It is obvious," say the Directors, "that until this branch be made, the "railway is *incomplete*, and therefore there is an "*indispensable necessity* for the completion of the "subscription. In fact, the Committee consider the "execution of this branch as *essentially necessary* to "insure *the liquidation of the different articles of* "*revenue*" which they had exhibited.

2. A branch to Newton Grange. The expense of this was to be incurred, in the first instance, by the Marquis of Lothian; and on this account it was proposed, that the Company should give up their right to impose a pontage at Esk Bank, on any commodities from that quarter, passing along South Esk Bridge to Leith. It may, however, be afterwards purchased by the Company.

3. A branch to Leith. The expense of this, as a single railway, was estimated at L.22,620, and for a double railway, L.29,628.

Thus a railway, which was originally estimated to cost L57,700, is found, even long before its completion, to cost, with *two* of the new branches,

which were considered as necessary for its efficiency and success, to require from L.132,000 to nearly L.140,000, exclusive of the third branch to Newton Grange; for which a compensation had to be allowed, and which it may afterwards be judged advisable to purchase.*

But while the public cannot fail to be struck with the great disparity between the *originally*, and the more *recently* estimated expense, (for it is still only *estimated*, the work being yet unfinished, and the *actual* expense unascertained) they must be still more astonished when they consider the *prodigious* mistakes which have been committed in estimating the expense of some particular parts of the work.

" Mr Jardine," say the Committee, " has accompanied the detailed statement of the extra expenditure with a view of the principal causes which have occasioned it.

1. The sum originally allowed for a Depot at St Leonard's was £2000, but there has been purchased upwards of 10 imperial acres; which, together with boundary walls and drains, have cost £12,014,

* Considering how much the expense of the Dalkeith Railway has exceeded the original estimates, it is not to be wondered at that the value of the shares has sunk prodigiously. Shares, which have cost L.50, can now be had for about L.20. In the Report of the Directors, February 1829, it was proposed to apply to Parliament for power to increase the capital stock of the Company to L.80,000, " *giving a preference to the new sub-*
" *scribers of the additional stock to draw dividends, yielding a re-*
" *turn of five per cent on their subscriptions, in preference to the*
" *present holders.*" Such are the advantages of being *original* subscribers to undertakings of this kind. Others come in afterwards to reap the fruit, (if indeed there be any fruit) or at least to have the preference.

10s. 6d.—*inde* the difference is,	£10,014	10	6
2. The cutting of the railway along the north side of the King's Park wall, was estimated at £2000; but, in order to avoid a heavy annual claim of Damages, and to save the wear and tear of Tackle and of Machinery, by the exposure to the weather, a Tunnel was adopted, by Mr Jardine's recommendation, which, with walls, will cost £12,937, 16s. 7d.—*inde*, the difference is,	10,937	16	7
3. The greater quantity and price of land, costs - -	8,300	0	0
4. The expense of stone and lime fence walls, from Cairntow's Road to Dalhousie Mains, above that of the original hedge and ditch,	5,140	0	0
5. The additional expense in smaller bridges, culverts and drains, on account of the greater price of stone, and greater quantity of masonry,	6,061	16	0
6. Addition to Surface Damage paid to tenants, - -	2,552	15	9
7. Expended on Fisher-row Branch, but which will be repaid when it is completed, - -	658	11	6
8. Several miscellaneous payments not contemplated in the original estimate, including £670, paid to Mr Wauchope of Edmonston, under the Act of Parliament, -	1,428	13	3
	£45,093	3	7

"From the preceding summary," the Committee add, "it must be evident to the proprietors, that there were sundry important omissions in the original estimate, which must have added considerably to the computed expense, according to whatever plan the railway was completed, while the additional purchases, and the more durable but expensive nature of some of the operations recommended by the engineer, to save ultimate charges, account for the remainder of the deficiency of funds which now occurs."*

Such is the apology made by the Committee for the *extraordinary* differences between the *estimated* and the *actual* amount of some parts of the expenditure,—an apology which it is not unlikely the Directors of some other railway companies may have to make, at a future day, to their constituents, after the bubble has burst, and the bright prospects in which their imaginations had indulged have vanished in air. It is, however, but poor consolation under such circumstances, to tell the shareholders, "that there were sundry *important* "omissions in the *original* estimate;" that "the "*additional purchases*, and the more *durable*, but "*expensive* nature of some of the operations recommended by the engineer, to save *ultimate* charges, "account for the *deficiency* of the funds which now "occurs." It is surely enough to destroy any man's confidence in the *prospective* calculations of such undertakings, when one item, which was estimated at L.2000, costs *six* times that sum, viz. L.12,014;

* Report by the Committee of the Edinburgh and Dalkeith Railway Company, February 1829, p. 2.

when another part of the work, which was, in like manner, estimated at L,2000, costs, in consequence of a change of the plan, upwards of *six* times that sum, viz. L.12,937; when another part of the expense is L.8300 more than was estimated; another L.6061; and another L.5140. If such errors are committed in regard to a railway of such small extent as that of Dalkeith, and the two chief of these errors, amounting together to nearly L.21,000, refer to ground, in the immediate vicinity of Edinburgh, *the nature of which is familiar to almost every inhabitant*, what mistakes may we not suppose are likely to be committed in regard to railways of such great extent as between Edinburgh and Glasgow, and over ground the greater part of which is previously unknown to the surveyor, and with the bearings of the different parts of which no engineer can be perfectly familiar, even after the most careful survey!

These statements relative to the great uncertainty of *prospective* calculations of the expense of railways are strikingly confirmed by a salutary and very important piece of advice which Mr Booth, the *Treasurer* to the Liverpool and Manchester Railway, gives, in regard to other undertakings of the same kind: "With reference," says he, "to any "similar scheme, in extension of the railway sys- "tem, it is desirable that projectors should *impar- "tially* calculate the cost of the work, as well as the "income it may be expected to produce; and *espe- "cially*, that they should *make an ample allowance*

"*beyond the first estimate of the expenditure*, before "they embark in the undertaking."*

Having thus shown that no dependence is to be placed on the *prospective* estimates which are given of the *expense* of a railway between Edinburgh and Glasgow, the Committee will next inquire whether any greater confidence is to be placed in the estimates of the *revenue*. As, however, the Liverpool Railway has been open, and that only partially, for little more than two months, and as there is no other railway in this country similar to one between Edinburgh and Glasgow, they might be excused, though, from want of *data*, they should pass over this part of the subject. But though they might plead this apology, they will not avail themselves of it. They will bring forward evidence, not in reference to some railway of a totally different description, but in regard to an Edinburgh and Glasgow railway itself; the witnesses, too, are of the most unexceptionable kind,—they are no other than Messrs GRAINGER and MILLER, and the COMMITTEE of Mr Jardine's line.†

* Booth's Account of the Liverpool and Manchester Railway, p. 46. If any thing further were necessary to demonstrate the *uncertainty* of Messrs Grainger and Miller's project, it is the singular, yet acknowledged fact, that, though they have given an estimate of the items of expense of a railway, they have not made a *particular* survey of the ground over which it is to go: they have, as yet, made only "an eye survey" of the country. "To enable us," say they, "to determine the most eligible line of railway across the "country, a *minute* survey of the country *must* be taken. This we have not accomplished."

† We do not know that Mr Jardine is responsible for the estimates of the *revenue*: they are given, not in his Report, but in that of the Committee.

Of the utter uncertainty of the estimates of revenue from such undertakings, we have incontrovertible evidence in the extraordinary discrepancy between the calculations of the income, from the respective railways projected by these gentlemen. No person can compare the different estimates, without being struck with astonishment, or without being satisfied that no dependence is to be placed on such calculations. The following are a few examples:

1. By Messrs Grainger and Miller's Report, the *total* revenue of the railway is estimated at L.81,760: By Mr Jardine's line, including L.5606 as the expense of passengers, it is stated at L.60,790; a difference of nearly L.21,000!

2. By Messrs Grainger and Miller, the revenue from *passengers* is estimated at L.53,040: By Mr Jardine's line, at L.17,606, which makes a difference of not less than L.25,434, *or nearly one half of Grainger and Miller's whole revenue!*

3. By Messrs Grainger and Miller, the revenue from *goods* is estimated at L.18,720: By Mr Jardine's line, at L.9500; a difference of L.9220, the one being only about one *half* of the other!

4. By Messrs Grainger and Miller, the revenue from *coal* is estimated at L.5000: By Mr Jardine's line, at L.17,150, making a difference of not less than L.12,150!

5. By Messrs Grainger and Miller, *lime* is very properly not mentioned as a source of revenue: By Mr Jardine's line, it is estimated at L.2425, though, had the Committee taken any pains to in-

form themselves, they might have known that in 1828, as has been already stated, it produced by the Union Canal only L.23, after it had been estimated that it would yield L.11,750 per annum !

6. By Messrs Grainger and Miller, the clear profit to the shareholders is estimated at upwards of 17 per cent: By Mr Jardine's line, it is estimated at nearly 9 per cent, or little more than one half of the other.

Such is a specimen of the extraordinary discrepancies between these two different Reports. Who, after such an exhibition, can place any confidence in the prospective calculations of the *expense* and the *revenue* of an Edinburgh and Glasgow Railway? Who, *except a man who does not know what to do with his money*, would risk his property, and that of his family, on such an undertaking?

While these extraordinary discrepancies cannot fail to throw discredit on the estimates of revenue, it is proper further to state, that some of these estimates are not merely uncertain, but utterly erroneous. *Passengers* are the great source of profit, according to Messrs Grainger and Miller's "Observations," forming nearly *two thirds* of the whole revenue. But in order to produce this revenue, they allege, that the number of persons travelling daily between Edinburgh and Glasgow by coaches, besides pedestrians and such as go by Canal boats, may be estimated at 300; and that, with the many and great advantages which railways will present, "the number "would be more than doubled. But let us," they add, "estimate the number at only 250 from each

town per day." Now in this statement there are several important fallacies.

1st, The basis of the whole,—that on which the conclusion rests,--we have reason to believe, is altogether erroneous. On inquiry, we have been informed that the number of passengers travelling daily by coaches between Edinburgh and Glasgow, is under 200; and if to these be added those going by the Canals, the whole will not much exceed 200, or 62,600 a-year,—a number as great as *prima facie* can be supposed to pass between the two cities, considering their population, and the kind of connexion which subsists between them. Now, adopting the principle of Messrs Grainger and Miller of *doubling* the present amount of passengers, and making a deduction corresponding to what they make from that number, this would give only 333 daily, instead of 500; and this deduction alone would produce a defalcation of revenue to the extent of nearly L.18,000.

2dly, Though the nearly *doubling* of the numbers is a most important item in the calculation, it is a mere assumption, unsupported by any adequate proof. Facility, and especially *cheapness* of conveyance, has no doubt in many other cases, vastly increased the number of travellers, when there were intimate and important connexions between places, or where one or both had peculiar attractions to travellers; but the relation between Edinburgh and Glasgow is not of that kind as to promise by any means such an increase of passengers as Messrs Grainger and Miller suppose, especially when it is considered that the chief advantage which they hold out is not *cheap-*

ness, but simply the diminution of time required for the journey. These gentlemen proposed 9s. for 200 inside passengers, at a time when the inside by the coaches was only 9s; and 6s. for 200 outside passengers, when the outside was only 5s.; so that, instead of being lower, the latter fare was higher than by the coaches.* Now, under these circumstances, and at these rates, there is a gross fallacy in supposing that the present number of travellers would be nearly *doubled*: this would be an *effect* without any adequate *cause*.

3dly, The calculation involves another fallacy, viz. that *all* passengers between Edinburgh and Glasgow are henceforward to go by the Railway; —that the whole of the coaches are to be swept off the roads, and the whole of the boats off the Canal, —or if they shall still go, that they will go without a passenger. Now, this is assuming rather too much. Great improvements have of late years been made in regard to the speed of coaches; and similar improvements, as we shall afterwards state, are at present in progress in regard to the Canal boats. Multitudes, we doubt not, will still continue to travel by the coaches and the Canals; for there will always be many to whom two or three additional hours are not an object, compared with the risk of broken bones, while flying, as is proposed, on the wings of the wind; or who will prefer travelling by a route through richly diversified scenery, to one well known to be so very

* They calculate, indeed, on another 100 outside passengers at 4s. which would be lower than by the coaches.

bleak and barren, as almost to beggar description. If, then, these fallacies are taken into account, it will be seen how little confidence can be placed in Messrs Grainger and Miller's calculations,—that the present number of passengers, amounting to about 200 a-day, or 62,600 a-year, will by the Railway, be increased to 500 a-day, or 156,500 a-year, though *the rates they propose are nearly the same as by the present coaches;* and that these passengers will produce the enormous revenue of L.53,040 per annum.

There are similar fallacies in their calculations relative to *goods.* The quantity of these they estimate at 200 tons a-day, making 62,600 tons a-year, which they calculate, at six shillings per ton, will produce a revenue of L.18,720. Now, on inquiry, we have learned, that the quantity of goods carted by the carriers between Edinburgh and Glasgow, is only about 40 tons a-week, or 2080 a-year; and the average of goods by the Union Canal, for the years 1827, 1828, and 1829, we find, was 11,841 tons. What quantity of goods pass between Glasgow and Leith *via* Grangemouth, we do not know; but we do not suppose that it is considerable. In 1815, there were shipped from Port Dundas for Leith, goods to the amount of only 1228 tons. Now, though it is probable that, since the opening of the Union Canal this quantity must be considerably diminished; and though it does not seem likely that so many goods will be sent from Leith to Glasgow as from Glasgow to Leith; yet we shall take the total amount as double that number, viz. 2456 tons. We have thus got what may be consi-

dered as nearly the amount of goods which pass between Glasgow and Edinburgh and Leith; but instead of Messrs Grainger and Miller's 200 tons a-day, or 62,600 a-year, we have only 52 tons a-day,* or 16,377 a-year; which, at 6s. per ton, instead of 18,720, would produce only £4,913,—a defalcation of nearly *L.*14,000 *per annum.*

It is worthy of notice, indeed, that Messrs Grainger and Miller do not suppose that the trade between Glasgow and Edinburgh will be by any means limited to 200 tons a-day. It is obvious they suppose it will be much greater, for they do not propose to engross the *whole* of it to the Railway. Of the present traffic they propose to themselves only "a considerable part." Now, should the trade not prodigiously increase, of which there is not much ground of hope—should the traffic continue much of its present extent—and should this traffic be *divided* with the Canal, Grangemouth, and the carriers, to how small a sum may their £18,720 be reduced! Mr Baird was moderate in most of his calculations of revenue for the Canal Company, compared with Messrs Grainger and Miller for the Railway. For goods he promised only £7407; yet nothing like this sum has ever been realized: the average of the three years ending December 1829, was only £1915.

The Committee of Mr Jardine's line are by no means so extravagant as Messrs Grainger and Miller, in their estimate of the revenue from *passengers.* Their calculation is limited to 300 per day, half at 5s.

* The accuracy of this estimate is confirmed by the Committee of Mr Jardine's line: they calculate the goods passing between Edinburgh and Glasgow, at 50 tons a-day.

and half at 2s. 6d., producing L.17,606 per annum; and, after deducting the expense of their conveyance, leaving L.12,000 of clear revenue. But though this is a moderate estimate compared with the other, it is still too high as to the number of passengers travelling betwixt Edinburgh and Glasgow, by about 100 a-day, or 31,200 a-year, *i.e.* by *one-third* of the whole; and besides this important error, it appears to proceed on the principle that the south line of railway, is, like the north, to engross the *whole* of the travellers betwixt Edinburgh and Glasgow, leaving the coaches and canal boats without a passenger.

The other most important source of revenue in the estimate by Mr Jardine's line, is coals, from which the Committee anticipate a sum of L.17,150. The sale of coals, it is stated, is believed to amount to nearly 400,000 tons in Edinburgh, and to 800,000 tons in Glasgow. The estimate for Edinburgh, we suspect, is exaggerated. Mr Baird calculated the consumpt of Edinburgh and Leith, sixteen years ago, at only 214,000 tons. The quantity of coal by the Union Canal, on an average of three years ending December 1829, was only 81,652 tons, yielding a revenue of L.8573, instead of L.20,893, the sum promised by Mr Baird. Now, we do not suppose that an Edinburgh and Glasgow Railway will destroy the Canal trade in *coal*. One of the principal advantages of railways is *celerity*; but though this may be of special advantage to travellers, yet in the conveyance of coals, and many other articles, it is of comparatively little consequence;—*cheapness*, as regards them, is the grand *desideratum*,—an ob-

ject which, we presume, may be accomplished by a canal, not less than by a railway. It is also to be recollected, that a railway, on which Mr Jardine himself lately made a report, is at present executing from Dalkeith and its neighbourhood, the chief object of which is to convey coals to Edinburgh and Leith; and in the last report of which, the Committee hold out to the subscribers the prospect of a trade in that article to the extent of 175,000 tons per annum. Now, supposing for a moment, railways to possess decided advantages over canals, yet how will the Edinburgh and Glasgow Railway be able to deliver coals as cheap, or cheaper, than the Dalkeith Railway, by which they will have to come only from 4 to 10 miles, while by the other, they will have to come 24 or 33 miles, when the mode of conveyance is in both cases the same? Supposing 175,000 tons, the quantity calculated to come by the Dalkeith Railway, and 80,000 to continue to come by the Canal, which must be allowed to be at least possible, and the importation into Leith from the coaleries of Fife, &c. to remain the same, there appears to be little probability of any considerable quantity of coal being required to come to Edinburgh by this new railway; so that this part of the revenue may be reduced to a mere trifle. With respect to Glasgow, we are less able to speak; but we presume, that there has hitherto been no deficiency in the supply of coal to that city; and now that, in addition to the Monkland Canal, there is the Garnkirk and other projected railways, we ap-

prehend it may fairly admit of a question, whether an Edinburgh and Glasgow Railway is likely to draw from coal conveyed to that city any considerable revenue? The estimated revenue of L.17,150 from this article may be reduced, in short, to a very small sum.

Having made these observations relative to the *expense* and the *revenue* of an Edinburgh and Glasgow Railway, the Committee beg leave to notice a *third* point, which is scarcely of less importance, so far as the returns to the shareholders is concerned, but which appears to be much under-rated,—the *annual* expense of the concern.

Messrs Grainger and Miller say—"As the Garnkirk Railway, as well as that proposed from the west termination thereof to the river Clyde, will form part of the general communication from sea to sea, a proportional deduction must be made from the revenue according to their relative interest, which, with the expenses of maintenance, management, and the expense attending the conveyance of passengers, may be estimated at about L.21,760."* The Committee of Mr Jardine's line, on the other hand, propose, for the expense of maintaining the railway, conveyance of passengers, management, casualties, &c., L.15,106.

Now, if any confidence is to be placed in the Reports which were made last year by Mr John U. Rastrick of Stourbridge, and Mr James Walker of London, to the Directors of the Liverpool and Manchester Railway, the proportion of the annual ex-

* Observations, p. 9.

pense to what is likely to be the actual revenue, will, in all likelihood, be much greater than the sums now mentioned. These two engineers were requested by the Committee to make, "on behalf of the Com- "pany, a journey to Darlington and the neighbour- "hood of Newcastle, to inspect the different rail- "ways in those districts, and to ascertain, by a "thorough investigation, into the power of the en- "gines, the cost of working them, and the compa- "rative merits of the two descriptions of moving "powers,"—meaning by this, stationary and locomotive engines. After making the necessary investigations, they reckoned, that for the stationary system, a capital would require to be laid out in engines, machinery, and buildings, amounting to no less than L.100,862, 1s.; and the total *annual* expense, including interest on this capital, they estimated at no less than L.33,317, 7s. 3d.

On the other hand, the locomotive system, they calculated, would require a capital of L.90,403, 14s. 3d.; and the *annual* expense, they estimated at not less than L.43,464, 9s.

These sums, let it be remarked, are simply for the engines or moving power employed on the railway. They are exclusive of the expense of working the Liverpool tunnel, and also of the wear of rails by the engines travelling upon them.* Now, though an Edinburgh and Glasgow Railway will not require nearly so great an expense on account of engines as the Liverpool and Manchester Railway,

* Report to the Directors of the Liverpool and Manchester Railway, on the comparative merits of Locomotive and Fixed Engines, by John U. Rastrick.—P. iv. 37.

because, as we shall soon show, the trade upon it will be incomparably less; yet still the expense on this account will be very considerable—far more considerable than, from any thing that appears, is calculated upon by Messrs Grainger and Miller, or the Committee of Mr Jardine's line. And if to this be added the expense of carriages, of repairs, of management, &c. we suspect the sum total will greatly exceed the proportion which they suppose it to form of the gross revenue.

Now, if these three points be considered,—the probability of the original *expense* of the projected railways being much greater than is estimated,—of the *revenue* being much less,—and of the *annual* expenditure being much more; it may fairly be made a question—not, Whether an Edinburgh and Glasgow Railway will make a handsome return to the original shareholders? but, Whether it will make any return at all?

That this is a questionable point, will appear still more evident, if we compare the probable traffic of the Liverpool and Manchester Railway with the probable traffic of an Edinburgh and Glasgow Railway. It is the success which appears to be attending the Liverpool Railway which is producing the delusion in regard to a Glasgow Railway. "The "intercourse between Liverpool and Manchester, "and other parts of Lancashire," say Messrs Grainger and Miller, "is very great. It cannot, however, "*materially* exceed, *if it exceed at all*, that between "Glasgow, Paisley, and other parts of the west of "Scotland, and Edinburgh and the east coast of

" Scotland. Proceeding on this high authority, we " presume the formation of a similar communica- " tion between these places; and indeed, for some " years past, more especially within the last few " weeks, the public have become quite alive to its " great importance, *and as to its utility there cannot* " *now remain a doubt.* We are persuaded, there- " fore, that such a connexion cannot remain long " unexecuted." *

The success of the Liverpool and Manchester Railway, then, is the foundation of the splendid hopes which are held forth of the success of an Edinburgh and Glasgow Railway; but to assert that the cases are at all parallel, requires no small degree of hardihood; for though at first sight there may be an apparent resemblance between them, no two cases can be more unlike. They resemble each other in this, that at the ends of the line there are two towns containing a large population; that these two towns are separated from each other, in the one case 31, in the other 44 miles; and that one of the towns, at the end of each of the lines, is the seat of a great cotton manufacture. But here the resemblance stops. In regard to the extent of the communication and trade between Liverpool and Manchester, on the one hand, and Glasgow and Edinburgh, on the other, which *is the main point on which the success of a railway must depend,* there is no resemblance whatever.

The trade of Glasgow and Leith is never for one moment to be put in comparison, as to *extent,* with

* Grainger's Observations, p. 4.

the trade of Liverpool. In 1826 the following was the number of vessels which entered and left the port of Leith:

	Inward.	Outward.
From foreign parts,	398	323
Coastwise, -	3230	1735
	3628	2058

The number of vessels to and from foreign countries, it will be remarked, is quite inconsiderable; while most of those sailing coastwise, it may be presumed, were insignificant in size. In 1826, the whole vessels belonging to Leith measured only 25,674 tons.* We regret extremely that we are able to furnish but an imperfect, and not very recent statement of the trade of Glasgow. In 1810, there arrived at Greenock, Port-Glasgow, and the city of Glasgow, 3308 vessels, carrying 226,837 tons, of which 871 vessels, measuring 107,845 tons, were from Ireland and foreign ports.† In the year ending January 5, 1815, the amount of duties on goods reported *inwards*, on the Clyde, was as follows:

At Greenock, -	L.321,662
Port-Glasgow, -	241,395
	L.563,057‡

In 1827, the importations of Glasgow from the West Indies amounted to L.1,572,710.

* Campbell's History of Leith, p. 254, 255.
† Edinburgh Encyclopædia, Art. SCOTLAND, vol. xvii. p. 649.
‡ Cleland's Annals of Glasgow, vol. ii. p. 390, 391.

We regret also that our information relative to the trade of Liverpool is, in like manner, imperfect; but imperfect as these various notices are, they may give some idea of the vast disproportion between the trade of Leith and Glasgow on the one hand, and of Liverpool on the other.

"In 1815, the official value of the imports into "Liverpool amounted to L.8,000,000, and of the ex- "ports to L.12,000,000."

In September 1818, it was "estimated, that one "twelfth of the shipping of Great Britain was "furnished by Liverpool; that it had one *fourth* "of her foreign trade, and one *sixth* of her gene- "ral commerce; and that its exports and imports "amounted to not less than *one half of those of* "*London.*"

"In the year ending 5th July 1818, the num- "ber of ships amounted to 6779; the tonnage to "754,690." *

But vast as was the trade at this period, it has since greatly increased, as the following statements will show:

"In the year ending the 26th of June 1829, the arrivals at Liverpool comprised 11,383 vessels, measuring 1,387,957 tons:" † *i. e.* nearly *double* the amount of tonnage to what there was in 1818, only eleven years before.

"The exports of manufactured goods from Liver- "pool to India, China, and South America, during "the last *quarter*, exceeded those of LONDON by "nearly L.2,000,000. In the home trade, the rapid

* Edinburgh Encyclopædia, Art. LIVERPOOL, vol. 13, p. 49.
† New Monthly Magazine, 1829, Part III. p. 411.

" prosperity of that flourishing town is no less asto-
" nishing. The imports from Ireland were,

" Grain, flour, and oat-meal,	L.1,500,000
" Provisions, - -	1,100,000
" Live cattle, - -	1,200,000
" Manufactures, -	1,200,000
" Total value,	L.5,000,000" *

" If the town and trade of Liverpool continue to
" increase during the next century, as during the
" last, *they will soon rival London.*" †

But not only is there a prodigious disproportion between the trade by *sea* of Glasgow and Leith on the one hand, and of Liverpool on the other: there is a similar, or rather a much greater, disproportion between the *inland* trade of Glasgow and Edinburgh, and of Liverpool and Manchester.

Liverpool is not a manufacturing town; it is chiefly a port. The raw materials of the cotton and other manufactures, which are imported into it, are sent from it to Manchester, and the whole of the surrounding country, to be manufactured into various kinds of goods; and a great proportion of these goods are again sent back from Manchester and the surrounding country, to be exported from Liverpool. Glasgow, on the other hand, is at once the port and the great manufacturing town of the district in which it is situated. The raw materials which are imported into it are not sent to Edinburgh to be manufactured, and to be again returned in the form of goods to be exported from Glasgow.

* New Monthly Magazine, (August) 1828, Part III. p. 372.
† Ibid. (March) p. 132.

They are manufactured in the city of Glasgow itself, and in the surrounding country; and the great proportion of the goods are again exported, not *via* Edinburgh, but by the river Clyde. Edinburgh, in short, has comparatively little to do with the manufactures of Glasgow, except so far as the supply of its own inhabitants is concerned,—nearly as little in fact as with the manufactures of Manchester.

It is not, however, merely the raw material, and the goods manufactured from it, that pass between Liverpool and Manchester, which create an extensive traffic. Within a very limited circle around Manchester, it is said there are domiciled one million of inhabitants who are chiefly supported by trade; and as the country is not an agricultural district, a great proportion of the daily food of this immense population has to be brought up from the port of Liverpool.

Besides, there are within 40 miles to the east of Manchester, in the West Riding of Yorkshire, 6 or 700,000 people engaged in manufactures; and as a great proportion of Yorkshire goods are shipped from Liverpool, this must occasion a still further extension of the traffic with that town.*

"Liverpool," says the Scotsman, "is the port of "Manchester, as well as of the vast manufacturing

* By the returns of 1821, the whole population of Scotland amounted to 2,135,300 souls. By the returns of the same year, the population of Lancashire and the West Riding of Yorkshire alone, amounted to 1,889,400 souls; so that if we add to these, some of the neighbouring districts, we have a population more or less connected with, and dependent on the port of Liverpool, equal to the whole inhabitants of Scotland. It is perhaps the richest, most manufacturing, and most commercial district in the world.

" districts of Lancashire, Yorkshire, Staffordshire, " and Warwickshire. The raw materials of the " most extensive manufactures are received through " that great mart, and the manufactured goods are " exported through the same channel.

" The immense traffic and intercourse which exist " between Liverpool and Manchester, pointed out " those places as particularly requiring the esta- " blishment of this superior mode of communica- " tion between them, (*i. e.* a railway) and perhaps " *there is no other district in this or in any other* " *country* where a railway is so likely to succeed." *

Having made these general statements relative to the trade of Liverpool and the surrounding country, as compared with that of Glasgow, Edinburgh, and Leith, we shall now consider the probable traffic on the two railways.

In 1824, the average quantity of raw and manufactured goods transmitted between Liverpool and Manchester, was 1000 tons daily; and it now amounts to 1300 tons; about 1000 of which pass from Liverpool to Manchester, and 300 from Manchester to Liverpool. †

Now let us compare this traffic with that from Glasgow to Edinburgh and Leith. Messrs Grainger and Miller estimate this in *goods* to amount to 200 tons daily; but we have shown that it does not probably exceed 52 tons; and in this conclusion we are confirmed by the estimate of Mr Jardine's Committee, who suppose it to amount only to 50

* Scotsman, September 29, 1830.

† Booth's Account of the Liverpool and Manchester Railway, p. 6.

tons. Taking the quantity at 52 tons daily, the following will be the result:

	Daily.	Yearly.
Goods between Liverpool and Manchester,	1300 tons	= 406,900
Do. between Glasgow, Edinburgh, and Leith,	52	16,276
Difference between the trade of the two railways,		390,624

Thus it appears that the trade of Glasgow with Edinburgh and Leith is a mere *bagatelle*, compared with that between Liverpool and Manchester. The subtraction of the one from the other is scarcely felt to be any deduction from the amount.

It is obvious that the number of travellers will bear some proportion to the amount of the trade, as it is the trade chiefly which occasions the passengers. The passengers between Edinburgh and Glasgow, we have already stated, amount to about 200 per day. The Directors of the Liverpool Railway proposed to make provision for 1600 travelling by their conveyances. How far this estimate is correct, we have no means of knowing; but if it be correct, the following will be the number of passengers per annum, by the two Railways, supposing the *whole* of the passengers beween Edinburgh and Glasgow to travel by the Railway, which, we have already shown, is more than doubtful.

By the Edinburgh Railway.	By the Liverpool Railway.
62,600.	500,800.

We cannot enter into further details; but we shall here subjoin a statement of the quantity of traffic for which the Directors of the Liverpool Railway proposed to provide the power of convey-

anee, as stated in their instructions to Messrs Walker and Rastrick.

From Liverpool or towards Manchester.

Daily.	*Gross weight, about tons.*
1000 tons of Goods and merchandise, exclusive of waggons, from Liverpool to Manchester	1500
500 tons cattle, sheep, pigs, &c. that is, the cattle will occupy the room of 500 tons of goods, and the difference in actual weight will not be great	750
This large quantity may not occur more than two or three days in the week, still it must be provided for, as the conveyance of cattle cannot be delayed.	
400 tons of coals, a distance of 12 to 15 miles, say from Kenyon to Manchester	600
800 empty coal waggons, a distance of 8 to 20 miles, say from Liverpool to Whiston, Rainhill, and Newton	800
800 passengers from Liverpool to Manchester, occupying about 35 carriages	100
Gross weight towards Manchester ....tons	3750

From Manchester or towards Liverpool.

Daily.	*Gross Weight, about tons.*
500 tons of goods, lime, stone, &c. exclusive of waggons	750
300 empty waggons or stages, which will have brought cotton or other goods at 15 cwt each, say	250
200 empty coal waggons, a distance of 12 to 15 miles, say from Manchester to Kenyon	200
1600 tons of coals, a distance of 8 to 20 miles, say from Newton or Whiston to Liverpool	2400
250 empty cattle carriages	250
800 passengers from Manchester to Liverpool, occupying about 35 carriages	100
Gross weight towards Liverpool ....tons	3950

Making allowance for the weight of the waggons and for the coals not going the whole way, this trade may be deemed equal to about 4000 tons of goods, or 6000 tons gross, moving daily between Liverpool and Manchester.*

We do not pledge ourselves for the accuracy of these estimates; but we think we have said enough to show that the Liverpool and Manchester Railway, and the Edinburgh and Glasgow Railway,

* Report to the Directors of the Liverpool and Manchester Railway, on the comparative merits of loco-motive and fixed engines, by James Walker, p. v. 6, 7.

are in no degree parallel;—that whatever success may attend the one, affords no ground to conclude as to the success of the other; and that nothing can be more erroneous than to assert that the intercourse between Liverpool and Manchester does not "*materially* exceed, *if it exceeds at all*, that between "Glasgow, Paisley, and other parts of the West of "Scotland and Edinburgh, and the East coast of "Scotland."

Not only, however, is there no comparison between the traffic from Liverpool to Manchester, and from Glasgow to Edinburgh, in respect to its *extent*, but the means of communication between the two former places, were much less perfect than between the two latter; while, at the same time, the improvements which have recently been introduced in regard to the speed of canal communication, essentially diminish the probabilities of the success of a Railway from Edinburgh to Glasgow.

By the Railway projectors, it is supposed there can be little doubt, that if a Railway were formed between Edinburgh and Glasgow, that they will withdraw the road passengers from the coaches by a reduction of charges and saving of time; but it must be observed, that this is by no means so certain as in the case of Liverpool and Manchester. There, the distance by the Railway is seven miles shorter than by the turnpike road, and the total rise in the way of the carriages between Manchester and Liverpool, does not much exceed one hundred feet in twenty-nine miles, which is the length of the Railway, independent of the Tunnel to the Docks,

which is not entered or traversed by the Railway coaches. No railway can be formed nearly so short as the turnpike road between Edinburgh and Glasgow, without a rise in the way of the carriages of upwards of 600 feet; and this rise is so distributed that to surmount it there must be at least three or four inclined planes, up which the carriages must be drawn by the aid of fixed steam engines. The delay and danger consequent on this rise, will be such as to give the coaches very great advantages in a contest with the Railway Company.

Besides, it is now demonstrated beyond a doubt, that it is perfectly practicable to move along canals at a rate much more rapid than formerly anticipated. Boats are now building of thin plate iron, which, it is expected, will perform the voyage between Edinburgh and Glasgow in a comparatively short period; and, in a short time, a steam-boat will be started, which the Forth and Clyde Canal Committee, for whom she is building, expect will perform the voyage with still greater velocity. It is an important discovery which has lately been made, that the surge generated in a canal by a light boat at a moderately rapid motion, such as four miles an hour, ceases altogether when a high velocity is employed. From this remarkable fact, it is not unnatural to conclude, that canal navigation may still be in its infancy, and there is no saying what improvements may yet be made upon it. These may certainly be expected to keep pace with the improvements on roads, and in all the accommodations of travelling.

With respect to the conveyance of goods between Liverpool and Manchester, the facilities were materially defective, compared with those which exist.

between Edinburgh and Glasgow. The great bulk of the extensive traffic between these two towns was carried on by means of two canals. Goods had to be sent up the river Mersey to Runcorn, a distance of twenty miles; and thence, by one of these canals to Manchester, making the whole distance between the two towns about fifty miles. In summer, there was frequently a deficiency of water, which obliged boats to go only half loaded; while in winter, they were sometimes locked up by frosts, for weeks together. Vessels, too, were often arrested in their progress up the Mersey, by contrary winds, and exposed to loss and damage from tempestuous weather. The *average* length of the passage was 36 hours; and owing to the causes just mentioned, there have been instances of goods being longer on the way from Liverpool to Manchester than from New York to Liverpool.*

Now, the communication between Edinburgh and Glasgow, by means of the canals, does not labour under any such disadvantages. Though it is longer than the communication by the common road, or than it may be by a railway; yet the difference is by no means so great as between the Liverpool water conveyance and the Liverpool Railway. Neither does it require on an average 36 hours to convey goods by it: they leave Edinburgh in the evening, and are delivered in Glasgow next forenoon; so that, as they proceed during the night, comparatively little time is lost. Nor is the conveyance of goods liable to that uncertainty which is experienced between Liverpool and Manchester; for as no part of the passage is by

* Booth's Account of the Liverpool and Manchester Railway, p. 11—13. Mechanics' Magazine, vol. XIV. p. 50.

water subject to wind and tide, the time may ordinarily be depended upon, unless in storms of frost and snow,—a casualty to which railways are much more liable than canals.

To all this, it may be added, that, notwithstanding the statements which are given of the cheapness of railways for the conveyance of passengers and goods, this has still to be proved: as yet it is even scarcely matter of experiment. If we take into account, not only the original expense of such undertakings, but the great expense on account of locomotive engines, (a single locomotive engine of ten horse-power being estimated by Mr Rastrick to cost not less than L.367, 4s. 4d. per annum,*) the tear and wear of waggons, and of the railroad, &c.; it appears natural to conclude, that the cheapness will be in favour of canals, especially when celerity is not required. It is a well known fact, that a good horse on a level railway can draw only about eight or ten tons, whereas on a canal, a very indifferent horse can draw fifty tons in a clumsy, ill-constructed boat; but in a well constructed iron-boat, it can draw sixty-five tons, in addition to the boat. A horse thus draws from 5 to $6\frac{1}{2}$ times as much on a canal as on a railway; and if steam, or any other power, is substituted in both cases, the result will probably be in a similar proportion in favour of canals. The expense, too, of the tear and wear of waggons on a railway is far greater than of boats on a canal.

Before leaving this subject, it may not be improper to remark, for the satisfaction of the share-

* Rastrick's Report to the Directors of the Liverpool Railway, p. 31.